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Editorial

Dynamics and Control of Complex and Switched Systems

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Hybrid systems are a class of complex systems involving both continuous systems and a set of discrete events. They exhibit complex phenomena as the continuous systems and the discrete events coexist and interact with each other. There are many hybrid systems that arise in a variety of disciplines. For example, in the manufacturing industry, components are fed into a machine following a specified procedure. The process of the machine is continuous, while the startup of the machine is a discrete event. Thus, the overall system is clearly a hybrid system. As an important class of hybrid systems, switched systems can model the hierarchy and switching structures of a complex system. Engineering examples can be found in chemical processes, air traffic management systems, and computer communications systems, and so forth. However, till now theory and methodologies of switched systems, in particular, involving complicated structure characteristics, still need to be investigated further.

In "Stability of a Class of Stochastic Nonlinear Systems with Markovian Switching," output feedback stabilization of stochastic nonlinear systems with Markovian switching has been investigated using the backstepping design method and homogeneous domination technique. In "Research on Adaptive Dual-Mode Switch Control Strategy for Vehicle Maglev Flywheel Battery," dual-mode adaptive hybrid control has been presented based on H_∞ control and unbalance displacement feed-forward compensation control. Furthermore, a real-time switch controller has been designed as well. In "Study on the Dynamics of Local Pressure Boosting Pneumatic System," dynamics of local pressure boosting pneumatic systems has been studied by modelling them as switched systems. Moreover, optimization problems of the local pressure boosting system have been solved as well. In "A Lower Extremity Exoskeleton: Human-Machine Coupled Modeling, Robust Control Design, Simulation, and Overload-Carrying Experiment," a robust H_∞ control method and a switched control algorithm have been developed for hydraulic actuators in human-machine coordinated motion. It shows that the proposed robust controller can improve the robust stability and performance under the structural and parametric uncertainty disturbances. In "A Multiobjective Genetic Algorithm Based on a Discrete Selection Procedure," a multiobjective genetic algorithm has been studied and applied to identify optimal solutions with better elitism and diversity metrics. In "Infinity Period Dynamic Control of a Kind of Channel's Price and Brand Investment: A Differential Game Method," infinity period dynamic control of distribution channels has been considered using a differential game approach. It includes four differential dynamic control models: coordinated static games, uncoordinated static games, Stackelberg games with controlled manufacture, and Stackelberg games with controlled retailers. In "Developing a Robust Strategy Map in Balanced Scorecard Model Using Scenario Planning," a strategy map-based method has been developed for environmental scenarios and a new method has also been proposed to decide the robustness degree of the strategy map for every scenario's contingency. In "Virtual Clutch Controller for Clutch-to-Clutch Shifts in Planetary-Type Automatic Transmission," an equivalent method has been proposed to control automatic transmission like dual clutch transmission by adopting the torque ratios

of oncoming clutch and offgoing clutch of each gear. In "Construction and Application Research of isomap-RVM Credit Assessment Model," cutting-edge algorithms, applied isometric feature mapping, and relevance vector machine (RVM) have been studied to classify assessment and further improve the accuracy of credit assessment methods. In "The Study of a Mathematical Model in Information Acquisition and Disclosure," a mathematical model with a decision-maker and an expert has been analysed to obtain the expert's information acquisition and disclosure strategy.

The aim of this special issue is to report the recent research progress and advances on all issues and topics related to complex and switched systems and their applications. We hope that this special issue will be beneficial to scientists, researchers, and practitioners in all disciplines, particularly in various application areas.

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